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THE SCIENCE OF TICKLISHNESS.

BY DR. LOUIS ROBINSON.

THERE is a curious parallel between certain branches of physiological research and the work of the archæologist who rebuilds history by unearthing early relics of human handiwork. Usually, as in the examples of remnants of a past age still existing in our bodies, already dealt with by the writer in the pages of this REVIEW, we get little more than stray hints of special habits and traits of our progenitors, just as the antiquary, from the study of some primitive tool or weapon, is able merely to infer some curious point in the habits of the unknown users. At times, however, as I hope to show in the following pages, we light upon a more detailed and continuous record, which may be compared with the successive layers of human relics in the mud of the Swiss lakes, where the old amphibious savages once lived for many generations, or even with the prehistoric inscriptions on clay or stone unearthed from the banks of the Euphrates.

The story which we can reconstruct from an analysis of such nervous phenomena as are summed up in the word "ticklishness" is one infinitely older than any which the archæologist has to tell. Yet, although the history is contained, not in stone or metal, but in a material so proverbially perishable as human flesh, it is probably (owing to the eternal persistence of well-established instincts) more trustworthy than many which have been reconstructed from fragmentary material records; while the gaps which we have to fill by conjecture can be bridged with at least an equal approximation to the truth.

Now, when we are engaged in an investigation of this character, it is necessary to keep in mind one very important law. *Not only every part of our physical frames, but every instinct and appetite, either is, or has been at some past stage of human*

history, necessary to secure the survival or prosperity of the race. In the case of many of our outgrown ancestral traits, it is difficult to prove the application of this law; but in discussing the phenomena of ticklishness, I hope to do so to the fullest extent.

When one has found a suitable little playmate, preferably a child of between three and eight years of age, and commences to tickle it, what happens? In the first place it becomes quite evident that, unless the child is in a playful and responsive mood, it cannot be tickled. If it be unwell, or if a stranger or one whom the child fears or dislikes attempt to tickle it, there is no response except resentment at an unwelcome interference. But as soon as a satisfactory *entente* is established, the little one laughs and wriggles with delight; and, although each movement is an elaborate avoidance of contact, there is a continual invitation to repeat the tickling. Practically all children, in fact, both by word and act show plenty of evidence of enjoyment of the game, and invite its continuance indefinitely. Hence, one may say that there exists a distinct *appetite for tickling*; and this upon close investigation proves to be as marked and real as any of the recognized animal appetites (all of which, by the way, have an *immediate* bearing on the continuance of the individual or the race); and, moreover, has this in common with them, viz., that there are times when desire is strong and gratification great, and there are times when desire is absent and provocation fails to take effect. Like the reflexes associated with the gustatory nerve, which make part of the appetite for food, the activity of which depends upon whether we are hungry or the reverse, the reflexes that accompany ticklishness are intermittent.

In addition to this intermittency, ticklishness possesses one noteworthy and essential characteristic, which may roughly be compared with the rapid alternations of an electric current. The desire is positive and negative by turns. Contact is wished, invited, and intensely enjoyed, up to a certain point. Then it suddenly appears to become distasteful, and is avoided with the whole energy of mind and body. Yet the moment that the too vigorous stimulation ceases, the appetite returns; and so the cycle continues.

Pursue the game vigorously, and our little playmate throws himself down on his back and fences with his limbs to protect the more ticklish parts. When one is dealing with an active

youngster, so much address is shown in these defensive tactics that it is very difficult to touch such regions as the neck, the armpits, or the groin. Many little children will spontaneously attempt retaliation with the teeth, which all the time, be it noted, are bared (in laughter) exactly as are the teeth of young apes and puppies at play.

It is necessary, before proceeding further, to explain that there are several forms of special irritability commonly spoken of as "ticklishness," which, from a physiological point of view, are quite distinct. It is only with one of these that we are now dealing, viz., that which is specially present in early life—when it is plainly associated with a natural desire or appetite which is intermittent, needing the subject to be in a responsive mood, and which is always associated with laughter and play.

The exquisite irritability of smooth or mucous surfaces such as the palate, nostrils, palms, and soles, appears to be of quite a different character, as also does the sense of titillation produced by the movement of a feather, or an insect, among the minute hairs of the skin. The first of these seems to be a provocation to certain appropriate muscular movements, such as grasping, swallowing, sneezing, etc., as is shown by the fact that, when these movements are performed, the special irritability, for the time being, disappears. The second is probably akin to an electric burglar-alarm, warning us of the presence of undesirable parasites.* A further distinction is noteworthy. One has a social significance, the others have not. We can tickle our own palates or feet, and cause intense irritation among the surface hairs with a feather. But no one can get even a smile out of himself—much less peals of convulsive laughter—by going into solitude and tickling his own ribs!

There is one other form of tactile sensibility which is commonly classed as ticklishness, with which we have nothing to do on the present occasion. This is the local sense of gratification which accompanies light touches in the nature of a caress. Apparently, such sensory impulses do not evoke a mechanical muscular response, and therefore they can hardly be called reflexes. The phenomena have, however, a social bearing which is sufficiently obvious; and their immediate utility in the case of animals

* These matters have been discussed at length by the writer in articles on Reflexes and Ticklishness in the Dictionary of Psychological Medicine.

which lick their young (among which may be included one family of the human race, to wit, the Esquimaux) is found in the benefits of cleanliness. Their complex relationship with the affections it is not our business here to discuss, but any student may find some very curious results from such stimulation narrated in the works of the great William Harvey.

Now, let us pay attention for a time to the more ticklish regions of the body, both in man and other animals. These I carefully mapped out after a great many experiments with young children, and every approachable young creature in the London Zoological Gardens, some years ago, when preparing a lecture on "Vestigial Reflexes" which was read before the British Association at Oxford. They are chiefly the armpits and contiguous parts; the ribs, especially where they join the abdomen; the front and sides of the neck, especially just above the collar-bone; the flanks and parts above the haunch-bones; the upper and inner parts of the thigh, over the region known to anatomists as "Scarpa's Triangle"; and on the limbs, the parts behind the knee and in front of the elbow. In a young chimpanzee, exactly the same parts are most ticklish; a baby orang seemed specially sensitive about the neck, but otherwise resembled its higher relatives. The only young gorilla which I had an opportunity of handling was morose and unwell, and could not be got in the mood. It, in fact, behaved very much like a sulky, ill-tempered child who declines to be tickled. Several young Indian monkeys, while agreeing generally with man and the anthropoids, showed a special sensitiveness about the flank. South-American spider-monkeys, and African guenons seemed much less ticklish than the anthropoids, macaques, and baboons; and it was difficult to tell where they were most sensitive. Young puppies and fox cubs are especially ticklish in the region of the neck, flank, and loin, but are less so in the ribs or the parts corresponding to the *axillæ*. In kittens it is very difficult to identify the more ticklish regions, but their larger relatives, especially lion cubs, are extremely sensitive about the neck. Kittens behave very much like children in a highly excited state, when the mere approach of the hand to any part of the body causes the same wriggling defensive movements as an actual touch. Such adepts are they in the art of fence that it is practically impossible to bring the finger into contact with anything but teeth and claws.

In young calves and fawns the process apparently gives no special pleasure. They are not responsive, like the young creatures above mentioned, and it is difficult to find any ticklish regions except the loin and flanks. Lambs and kids scarcely respond at all. Young colts showed most sensitiveness between the forelegs and in the flanks; but, in common with all hoofed quadrupeds, they exhibit no "appetite," and very little ticklishness as compared with children, apes, puppies, and kittens. As far as could be ascertained, creatures of a lower order were not ticklish in the ordinary sense of the word; although armadilloes, crocodiles and tortoises, when touched in spots not defended by their armor, at once tried to draw the exposed part into a place of safety. They showed no more pleasure at being tickled than does a sensitive mimosa or a snail.

Three chief points are made plain by these facts. Firstly, all the young creatures which obviously take pleasure in being tickled—which have the *appetite* in a marked degree—are naturally playful, and appear to take a special delight in romps of a rough-and-tumble character, which are essentially mock battles. Secondly, the regions which are especially ticklish and most carefully defended in these games are those which, in a serious fight with formidable teeth or claws, would prove most vulnerable. Thirdly, all these animals, with the exception of man, are armed in this way, and settle their differences by adroit use of such weapons.

Hence a young ape or dog which, in the innumerable sham fights of its youth learns to defend the *axillæ*, where a single bite might sever the axillary artery; the neck, with the carotids and windpipe just under the surface; the flanks, and borders of the ribs, where a comparatively slight tear lays open the abdominal cavity; and the groin, where the great femoral vessels lie close to the skin, would, without doubt, be vastly better equipped for the fierce combats for supremacy in after-life than an animal which had not undergone the same elaborate training. Warfare becomes more and more a matter of education, tactics and strategy, and less a matter of brute force, as the scale of intelligence is ascended. Among the lower orders of animals, whose actions are guided by stock instincts, and not by knowledge gathered from experience, the methods of attack and defence seem very elementary, reminding one of the "one, two, three,

four," of the stage "super" when engaged in a broadsword combat; but, when one comes to examine the fighting methods of brainy creatures, such as dogs and apes (the latter more especially), one is reminded of the elaborate science and address of the skilled fencer. There are innumerable feints and methods of attack, which are countered by a series of guards equally elaborate. Most apes, when fighting, endeavor to fix their long and sharp canine teeth in some vulnerable spot, and then thrust their adversary away with their arms so as to tear out the part seized. It will be seen at once that, supposing such tactics were successful in any one of the regions specified above, a deadly wound would be inflicted. Now, strategy, such as is shown in ape-warfare, depends upon experience, adroitness and adaptiveness and not upon inherent instincts. It must be *learned*; and a young animal which had not the advantage of an education derived from sham fights in early youth would be as helpless, when brought face to face with an experienced foe, as one of us who knew nothing of fisticuffs or sword-play would be if he were pitted against a practised pugilist or fencer.

An inquiry into the special warlike tactics of some other creatures which show a marked degree of ticklishness gives our argument additional support. All the *canidæ* and *felidæ* habitually attack the throat; and, in the romps of young puppies and lion cubs, it seems to be the chief end of the game to "get in" at this spot. Now, the throat and adjoining parts are in these animals markedly the most ticklish regions. There are reasons for thinking that among orang-outangs the same spot is more often assailed in actual warfare than is the case with chimpanzees, and a young orang appeared to be much more ticklish in the neck than a young chimpanzee. All the macaques seem much alike both in their ticklish regions (in which they closely resemble children) and in their manner of fighting. They will manoeuvre and finesse for a long time for an opening, and then spring in and endeavor to grip and tear. The African guenons and their congeners differ considerably from the macaques as regards ticklishness, and I have been informed that in their fighting methods they differ greatly also. They do not fence at close quarters, but dash past one another with lightning rapidity, inflicting ripping cuts with their terribly sharp teeth, which have whetted edges like the tusks of a boar.

Let us return for a moment to the law set forth above as to the evolutionary justification of every organ and faculty. How are we to show that the special sensitiveness to touch known as ticklishness, which is so strongly marked in children and monkeys, has been essential to the welfare of the race?

It will be best to confine our attention for the present to such creatures as are still living the same kind of life as their ancestors have lived for innumerable centuries, and whose natural warlike habits have not been warped by new conditions. The lowest men are much too high for us in this respect; but the higher apes, which, as far as ticklishness is concerned, behave almost precisely like human beings, still settle their differences with natural weapons, and in the primordial way.

In the struggle for existence, the real pinch comes, not when creatures are contending against "natural enemies"—that is, beasts of prey—but when they are striving for precedence among themselves. It is the contest between stag and stag which produces magnificent antlers, and it is the strife for the leadership of the herd which has given rise to the stupendous vigor of the bull. Nature may be said to foment this fratricidal war for her own ends, for it certainly is a powerful factor (perhaps the most powerful) in racial betterment.

Now, it seems to be good law that, whenever a male bird is large and gaudy, or a male mammal strong, pugnacious and well armed—as compared with the females of the same species—an indictment for polygamy will lie. The monstrous strength, brutal temper and huge fangs of the male gorilla tell as compromising a tale as do the teachings of Brigham Young. Laws of morality, however, are proverbially subject to latitude and time; and apparently for the same reason that moved her in conniving at family quarrels, Dame Nature winked at a plurality of wives. It is obviously to the interest of the race, from a purely animal standpoint, that the more robust should procreate the species; and this end among many of the less intelligent animals is attained by brute force and polygamy. Hence we can explain the social habits of deer, cattle and other polygamous creatures, where one powerful male battles for possession of the females, and holds his wives against all comers.

Now, doubtless, this arrangement worked very well until, in the upward march of evolution, some brains grew big enough to

plan and to remember. Then, I venture to assert, there arose an awkward hitch; and ticklishness was evolved to meet the difficulty.

In a community of apes, such as is still found in many tropical lands, presided over by a stalwart and wily patriarch who has won his position by victory in a hundred fights, the whole tribe is as strictly the patriarch's family as is the harem of a Turk. From time to time, of course, there grows up a young ape who in physical perfections excels the existing leader. It is plainly to the interest of the race that his perfections should be perpetuated as fully as possible. But this end can no longer be attained by physical qualities alone, as in the case of such animals as bisons, where, given dogged courage, the issue depended upon the weight of beef at the back of it. The old ape-king is a past master of the art of war according to his kind. He has all the resolute coolness of a veteran, and his big brain is teeming with cunning tricks and memories of innumerable battles. Mere physical superiority, backed only by inherent instincts, has no chance against practice, scientific strategy, and elaborate skill; and he is as much a trained and educated fighter as any member of the Mikado's General Staff. Were some well-known aspirant to contest the leadership with no more training than that possessed by a young bull or elk, a few rounds would settle the matter finally; for, even if he survived, he would probably be so astonished and demoralized by the treatment he had received that he would never resume the fray.

Nature, however, does not send a fine young warrior into the lists to fight her battles in the cause of racial improvements without providing him with adequate mental and bodily training. This he has gained, along with his growth, in incessant tussles with his playmates; for, at his birth, she implanted in him an insatiable passion for rough play, in which the appetite for tickling bore a material part. From his very infancy, he has been an adept at defending his specially ticklish, *vulnerable* regions in mimic war; and much practice has rendered these actions as instantaneous and automatic as the blinking of a threatened eye. He is not demoralized or disconcerted by a knock-down (as we should probably be if we received such treatment at the beginning of a fight), because he has been on his back thousands of times before, and knows as well how to continue the game in

that position as does a wrestler on his hands and toes. His muscles are as fit as those of a prize-fighter, for practically all his play has been part of a system of gymnastic training calculated for this very end—a system more perfect in many ways than any which has been evolved by the intelligence of man. Hence, in muscle, nerve and temper, he goes into his first serious battle magnificently trained and equipped. Hence, also granted his superior physical and moral worth, he comes to his rightful kingdom; and Nature, having got her own way, smiles upon his success.

All this will, I think, be fairly evident to every student of Nature's laws and methods. Its applicability to our own species, however, will perhaps not be so readily allowed. Yet, although the value of ticklishness in the economy of human life may have gone down to zero, seeing that we no longer gain social precedence and many wives by rolling with our rivals in the dust fighting tooth and nail, it is impossible to escape the conclusion that it played a most important part in the affairs of our direct ancestors. How otherwise are we to explain the practical identity of the phenomena in the young child and the anthropoid ape?

Moreover, although man's canine teeth now show no special adaptability for fighting purposes, there are other evidences to be found in our nervous systems as to what their function was in the past. Darwin clearly pointed out that when we lift our lip in a sneer, exposing one or another of the canine teeth to view, we are indulging in what was once a distinct threat of hostilities. We are, in fact, doing exactly the same as does an angry dog or ape when it shows its teeth. Probably there is no more universal habit than that of "setting the teeth" when we are facing a foe or a difficulty in a determined mood, and this can only be accounted for by presuming that it was with these weapons that foes and difficulties were at one time encountered.

Having now shown, by an analysis of its phenomena, that ticklishness is a revelation of man's past habits and history, let us consider what we may learn from the fact that its utility has wholly come to an end. A very brief investigation suffices to show that the time of its disappearance as a necessary adjunct to education must have been one of the most momentous in human history. The old methods of self-defence, so assiduously taught by such means, must have been rendered wholly useless

directly man learned to adapt external objects, such as sticks, stones, to his many needs. Then occurred a revolution even more drastic than that which followed Roger Bacon's discovery, when "villainous saltpetre" exploded the methods of steel-clad chivalry, and sent all its glittering paraphernalia into the scrap-heap. Neither the stab of a spear nor the smashing blows of a stone axe could be warded off by any tricks of fence, however skilful and elaborate, which were part of the old methods of warfare.

Hence we may say that, in the economy of human life, the end of ticklishness was the beginning of art.

LOUIS ROBINSON.